



☐ Electrical ☐ Mechanical ☐ Water Meters
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4th November.2000

OPERATING MANUAL FOR:

KARANA DOWNS 1060 DIA TRUNK MAIN

CATHODIC PROTECTION SYSTEM

CLIENT:

BRISBANE WATER
WATER MAINTENANCE SECTION

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DRAWINGS

(No Number)	Six Monthly Maintenance Program
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(1.0) **INTRODUCTION**

Steel when immersed or covered in water has a tendency to corrode (or rust) as the oxidized form is more stable than the metal.

Because of this, precaution must be taken to stop or minimize the corrosion reaction to an acceptable level consistent with the design life of the structure. This is normally achieved by the use of protective coatings which control the corrosion reaction by isolating the steel from its surrounding environment.

However, it is not practical to achieve a perfect coating and coating damage will always occur with time. Because of this, corrosion may occur at imperfections in the paint coating, causing further deterioration in the coating as well as loss of metal.

As a result of this, the coating defects must be rectified by periodic maintenance or an additional method of protection used to prevent this deterioration and corrosion occurring. This additional protection is achieved by the cathodic protection system.

(2.0) **CORROSION AND CATHODIC PROTECTION**

Corrosion is an electrochemical process in that it is accompanied by a flow of electrical current.

Corrosion occurs on the surface of metals at active areas known as anodes, which are electrically continuous with less active or passive areas known as cathodes. The electric current flows from the anode through the electrolyte to the cathode, with the circuit being completed by the electrical continuity between the cathode and anode. In practice anodes and cathodes are generally part of the same metallic surface and individual anodic areas may be small.

In applying cathodic protection an external current is applied to the surface so that the entire surface to be protected acts as a cathode. This involves the use of an auxiliary anode and when the current flow from this anode is sufficient, no part of the structure acts as an anode.

While it is the flow of current which achieves the cathodic protection of the surface it is impractical to measure these currents over individual anodic areas to determine when cathodic protection has been achieved. However, with the flow of cathodic protection current, the structure becomes more negative with respect to the surrounding electrolyte. Because of this, it is possible to state values of metal/electrolyte potential at which corrosion does not occur. This metal/electrolyte potential is generally measured against a standard reference electrode which allows a reproducible potential at which corrosion does not occur to be quoted.

(3.0) **MAINS DETAILS**

Size: 1060 mm Dia mild steel cement lined.

Coating: Tar asbestos.

Length: Appox 3.0 kilometres.

Location: From valve pit (branch off S87 –Holts Hill to Mt. Victoria), access to paddock near Banksia Drive to valve pit at Brisbane River crossing. Illawong Way Karana Downs.

Construction

Drawings:

486/1/22-AA1T0001E

Cathodic Protection Test Points

(4.0) **CATHODIC PROTECTION DETAILS**

(4.1) Type of Cathodic Protection: Sacrificial System.

(4.2) Cathode: The cathode point is located on the 1060 mm dia main, adjacent to the scour valve in the park off Illawong Way. The second cathode point is at the scour valve in parkland off College Rd. The cathode point is where the cabling from the test point is attached to the structure under cathodic protection.

(4.3) Anodes: Ten of ten kg magnesium anodes were installed on this system. At test point No.3 four anodes are installed approximately 80 metres from the trunk main, in a bed 3 metres deep. At test point No.4 the second anode bed is installed 20 metres from the trunk main and 4 metres deep. The anodes are backfilled with gypsum thereby improving anode - ground resistance. The anode bed locations are identified by a marker post. See layout drawing.

(4.4) Test Points: Test points are installed on cathodically protected structures to enable testing to ensure full protection of the mains. On this main six test points have been installed which can be identified from the layout drawing.

(4.5) Associated Drawings:
Cathodic Protection Test Point Details - 486/1/22-AA1T0001E

(4.6) Associated Standards:
AS 3000 1991 Australia Wiring Rules
AS 2832.1 1991 Pipes, Cables, Ducts, Guide to Cathodic Protection,
Part One.

(4.7) Government Regulations:
Queensland Electricity Acts and Regulations.

(5.0) **PERFORMED TESTING**

- (1) Natural Potential Survey
- (2) Soil Resistance Testing.
- (3) Current Drain Survey
- (4) Final Potential Survey and Commissioning.

(6.0) **CONCLUSION**

Full Cathodic protection has been achieved on this section of reticulation main.

(7.0) **MAINTENANCE**

The cathodic protection system is maintained on a six monthly basis after commissioning. These checks involve testing operation and recording of pipe to soil potentials.

4th November, 2000.

Electrical Engineering Unit.

Cathodic Protection

Commissioning Results.

CPS 194 Karana Downs 1060 dia Trunk MSCL Main.

Test Point No.3 Park College Rd.

1	Natural Potential (CuSo4 Ref. Cell)	- 710 mv
2	Polarised Potential ON (CuSo4 Ref)	- 925 mv
3	Polarised Potential OFF (CuSo4 Ref)	- 748 mv
4	Polarised Potential ON (Zinc Ref)	- 80 mv
5	Polarised Potential OFF (Zinc Ref)	- 109 mv
6	Soil Resistivity at 4 metres	28.8 ohm metres
7	Anode Current 1 and 2 in parallel	51.0 mA
	3 and 4 in parallel	35.0 mA

Test Point No.4 Park Illawong Way.

1	Natural Potential (CuSo4 Ref. Cell)	- 720 mv
2	Polarised Potential ON (CuSo4 Ref)	- 1025 mv
3	Polarised Potential OFF (CuSo4 Ref)	- 952 mv
4	Polarised Potential ON (Zinc Ref)	+ 30 mv
5	Polarised Potential OFF (Zinc Ref)	+ 140 mv
6	Soil Resistivity at 4 metres	14.0 ohm metres
7	Anode Current 1,2 and 3 in parallel	55.0 mA
	4,5 and 6 in parallel	53.4 mA

4th November, 2000.

Electrical Engineering Unit.

Cathodic Protection

CPS 6 Monthly Maintenance Details.

Required:

- 1/ Notify plant operator and/or sign entry logs where necessary.
- 2/ Have appropriate keying.
- 3/ Set of tools. (Electricians)
- 4/ Multimeter.
- 5/ DC clampmeter.
- 6/ Copper sulphate reference cell and leads.
- 7/ Cleaning equipment.
- 8/ Gatic cover lifters.

Labour:

One tradesperson electrical, one labourer, one vehicle.
Two hours per site.

Procedure:

- 1/ Identify system.
- 2/ Check system for operation.
- 3/ Record voltmeter.
- 4/ Record ammeter.
- 5/ Record "on" potentials for all test points.
- 6/ Record "instant off" potentials for all test points.
- 7/ Record "off" potentials for all test points.
- 8/ Perform loop resistance and record.
- 9/ Check and record anode string currents.
- 10/ Comments.
- 11/ Log entry.

Brisbane Water Engineering Services

CP Form No. 23

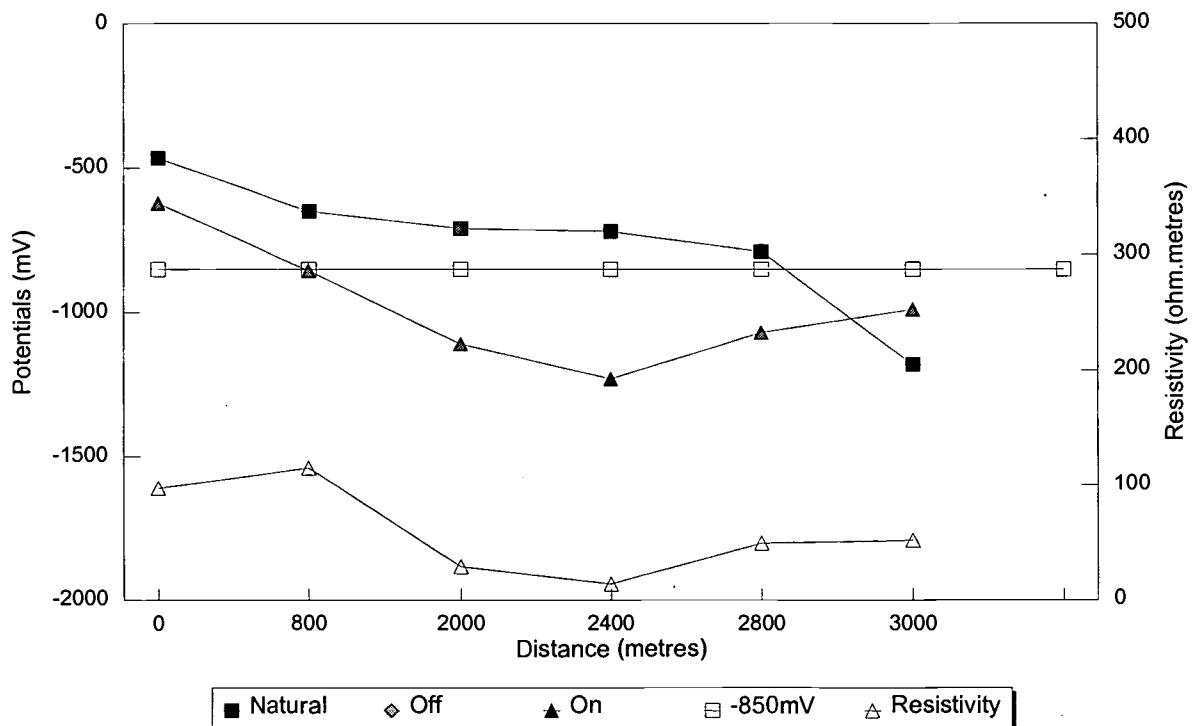
Electrical Engineering Unit**Cathodic Protection System Potential Recording Form****Project** Karana Downs Trunk Main**Date** 4th November 2000

Test Point number	Distances to T.P. (metres)	Potentials to CuSO4			Resistivities at 2 metres (ohm.metres)
		Natural (mV)	Off (mV)	On (mV)	
1	0	-465		-622	97.4
2	800	-650		-855	115
3	2000	-710		-1110	28.8
4	2400	-720		-1231	14
5	2800	-790		-1070	49
6	3000	-1180		-990	51.6
7					
8					

Note: Natural potentials as shown are potentials taken with system polarised by Ipswich City Councils impressed current system.

Unprotected potentials at Test Point 1 are -253mv (CuSo4 Ref)

Polarised Potentials at Test Point 6 are -1007mv (CuSo4 Ref) Ipswich City side.

Graph of potentials and resistivity vs pipelength

Anodes located 2000M & 2400M.

EARTHING SERVICES PTY LTD

155 Williamson Road
MORAYFIELD Q 4506

TAX INVOICE

Invoice #: 00000002

Date: 17/07/00

A.B.N. Number: 63 081 987 519

Page: 1

Bill To:

Brisbane Water
25 Bunya Street
EAGLE FARM QLD 4009

ATTN. LES GRAVES.

Description	Amount	Code
KARANA DOWNS NEAR ILLAWONG WAY		
7hrs 30mins Earth Drilling at \$70 per hour	\$525.00 GST	
1hr Travel Time at \$70 per hour	\$70.00 GST	

Terms: Net 30th after *30 DAYS* Tax: \$59.50

MEMO	CODE	RATE	TAX	SALE AMOUNT	Total Inc GST:	\$654.50
	GST	10%	\$59.50	\$595.00	Amount Applied:	\$0.00
Balance Due:						\$654.50

Brisbane Water Engineering Services

CP Form No. 37

Electrical Engineering Unit**Cathodic Protection Six Monthly Maintenance Check Form**Installation. Karana Downs TM CPS No.

SWB No.

Unit Reading before test _____ Volts.

_____ Amps.

Date.

- 7 - 11 - 00

Unit Reading after test _____ Volts.

_____ Amps.

Check List

Loop Resistance	
Voltage	Current

- (A) Check Switchboard for damage. ()
 (B) Clean Switchboard Exterior. ()
 (C) Zero Voltmeter and Ammeter. ()
 (D) Check there are two spare fuses of each type in switchboard. ()
 (E) Check Test Point Identification. ()
 (F) Check Individual Anode String. ()
 (G) Check Individual Anode Current. (1)

(2)

(3)

Test Point No.	Potentials As Found		Potentials After Maint.	
	On	Off	On	Off
TP1. UP	-253			MT Crosby end.
Zn	-1078			
ZnUP	+826			
PP	-622			
Zn	-1077			
ZnPP	+430			
TP2. P	-855			Emungerrie
Zn	-1019			
ZnP	+175			
		OVER		

COMMENTS: Polarised Potentials As Requested.Instrument IN11

Tested By.

JS

Brisbane Water Engineering Services

CP Form No. 37A

Electrical Engineering Unit

Cathodic Protection Six Monthly Maintenance Check Form TP Readings

Kardana Downs TM

7-11-00

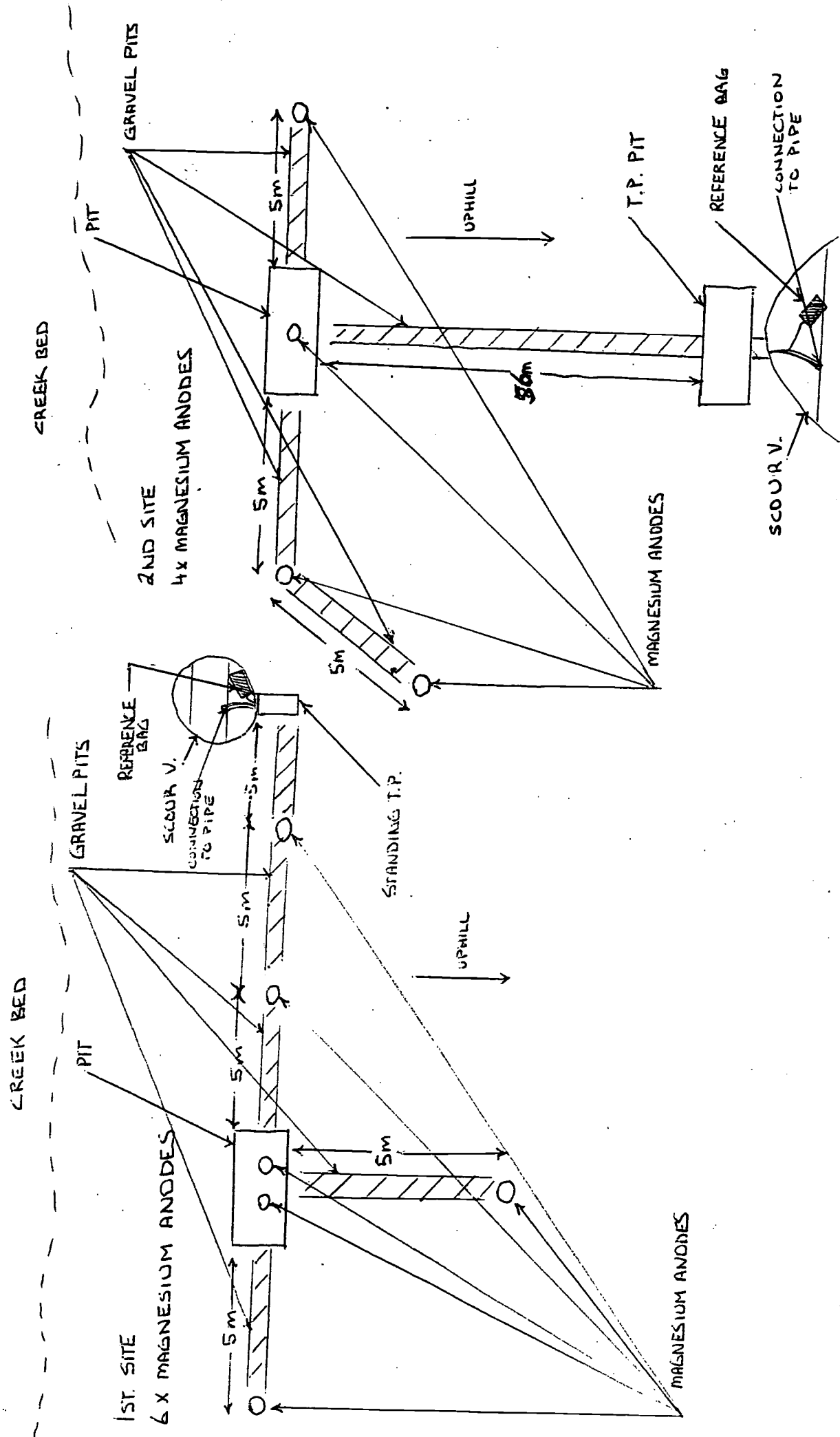
Test Point No.	Potentials As Found		Potentials After Maint.	
	On	Off	On	Off
TP3 College Rd				
P.	-1110			
Zn	-1019			
Zn P	+095			
TP4			11 Laying ST Anode bed @ Scour	
P	-1231			
Zn	-1335			
Zn P	+105			
TP5	P	-1070	cul 8/10 Sac 11 Laying ST	
	Zn	1098		
	Zn P	+29		
TP6			River Xing	
	Blue	-990		
	Black	-998		
	Yellow	-1007		
	Red	-1004		
Yellow Red.		Ipswich impressed.		
System				

JS

KARANA DOWNS

ILLAWONG WAY.

COLLEGE RD

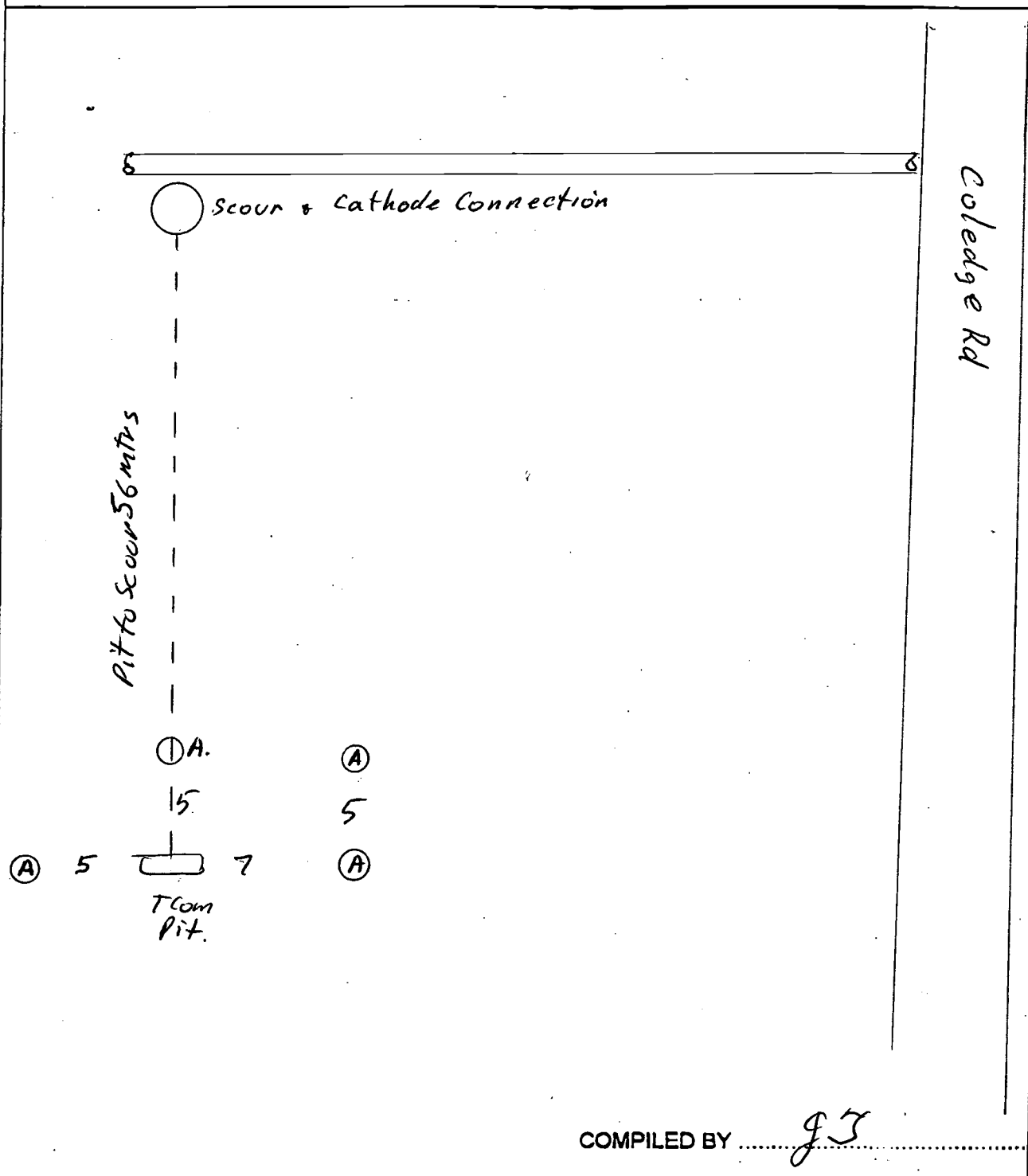


Brisbane Water Engineering Services

CP Form No.

37B

Electrical Engineering Unit

Site Plan Drawing Sheet *Test Results*Project *Karana Downs*Date *7-11-00*

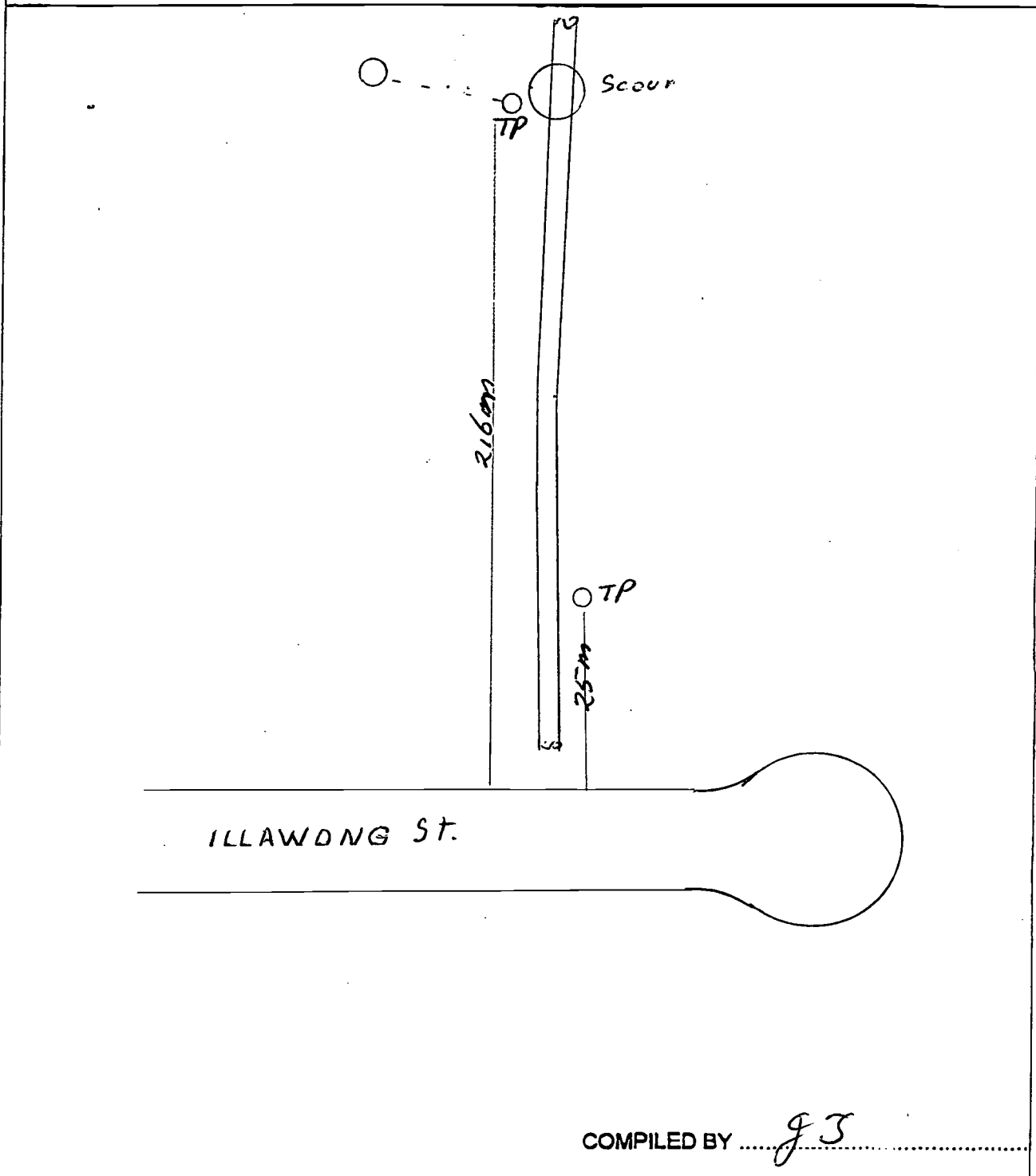
Revision 09/28/95

Brisbane Water Engineering Services

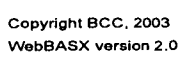
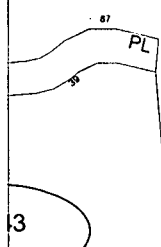
CP Form No.

37B

Electrical Engineering Unit

Site Plan Drawing Sheet *Test Results*Project *Karana Downs*Date *7-11-00*

Ellenora Way
Bremner Rd

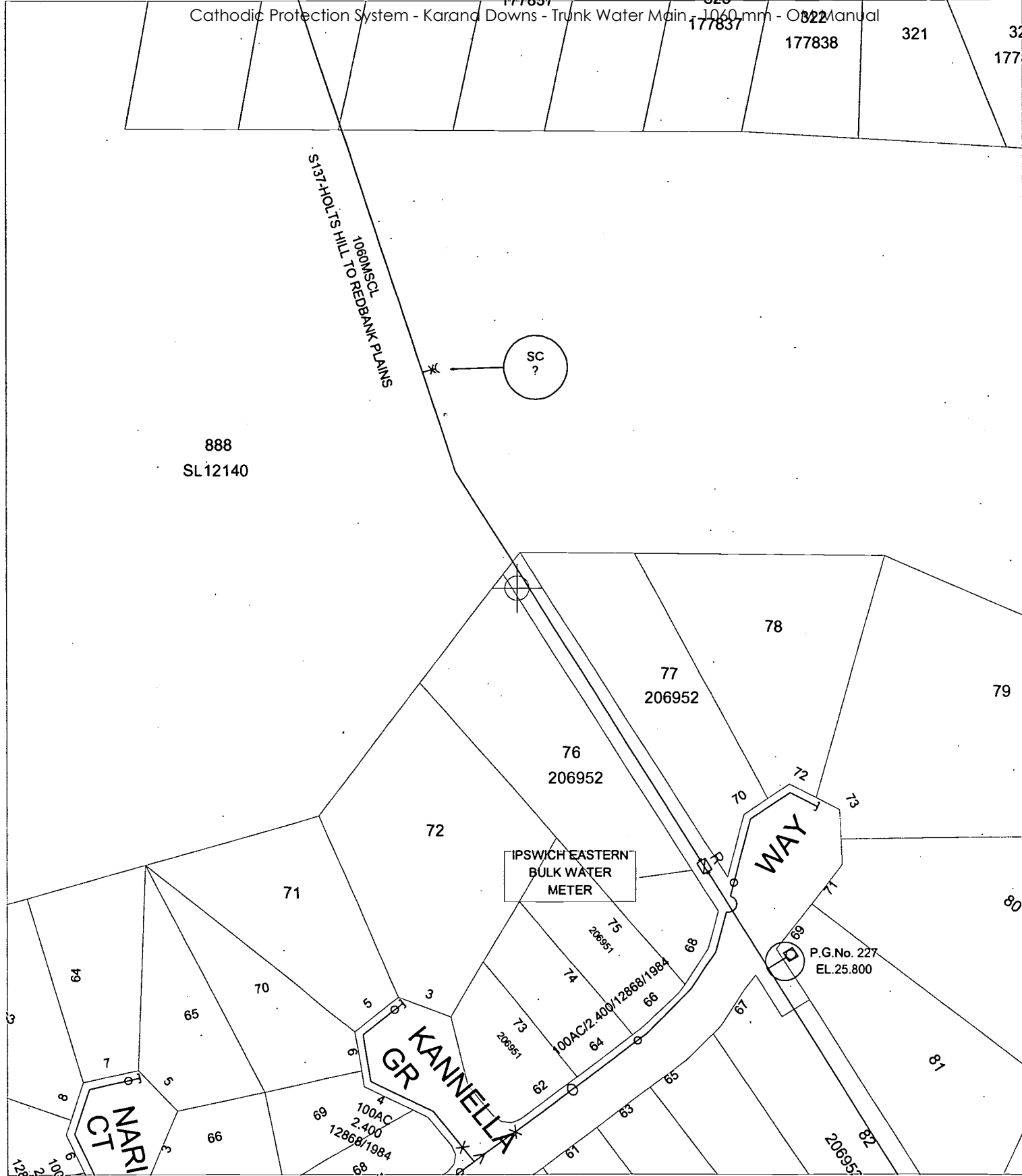


Location:
481538 6955434

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Cadastral Data (May 2005)





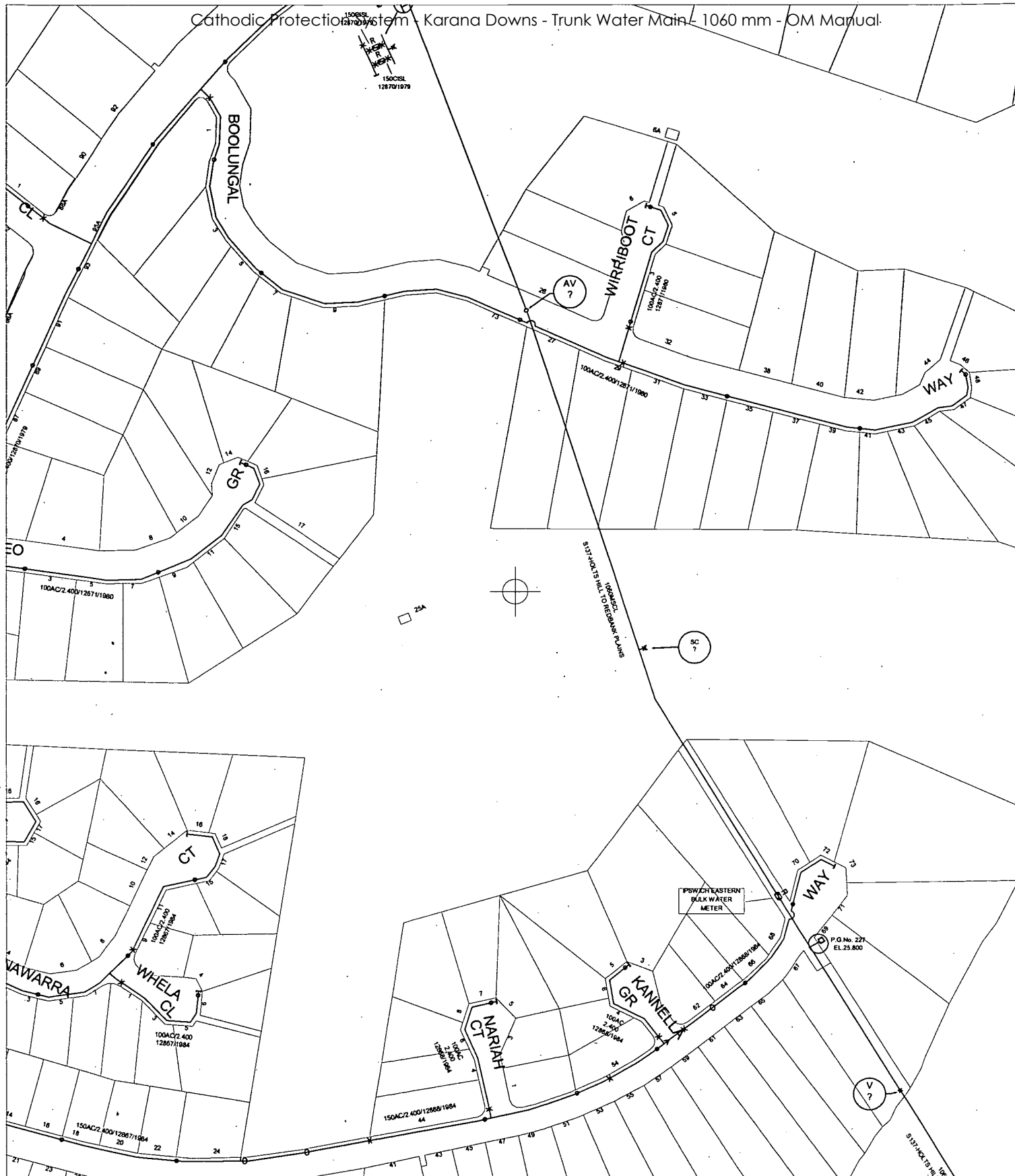
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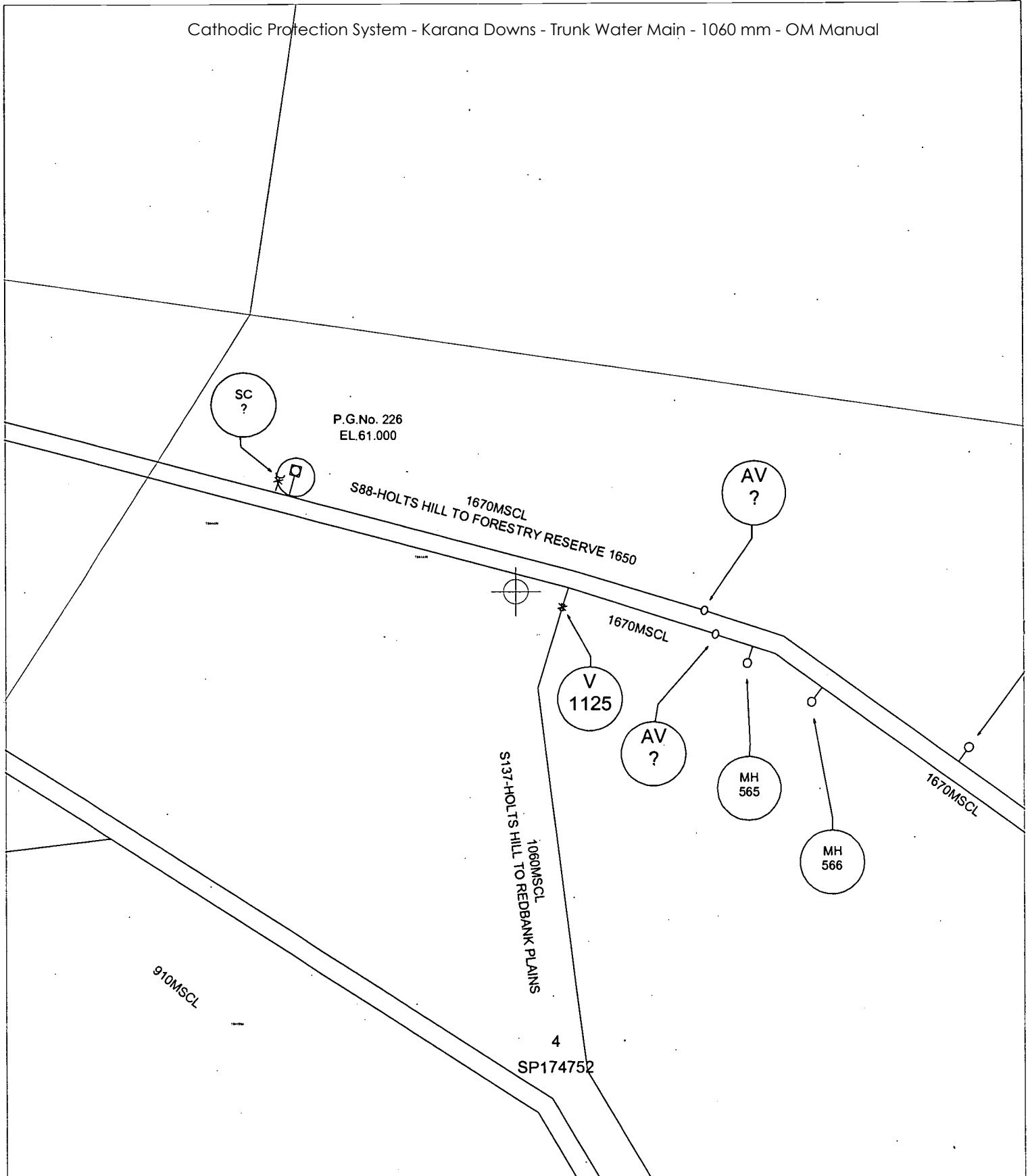
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Themes:
Cadastre
Water Supply BCC

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